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BRIER, JEFFERY A	

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CHARLES F. NEUGEBAUER

Appeal 2007-3027
Application 09/536,880
Technology Center 2600

Decided: January 10, 2008

Before MAHSHID D. SAADAT, ROBERT E. NAPPI, and JOHN A. JEFFERY, *Administrative Patent Judges*.

NAPPI, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 6(b) (2002) of the final rejection of claims 3, 5 through 10, 12 through 16, 18 through 22, 24, and 25.

We reverse the Examiner's rejections of these claims.

INVENTION

The invention is directed to a method of image scaling. The method selects and applies a convolution kernel to scale a portion of the image based

upon local image content. See pages 1 and 5 of Appellant's Specification. Claim 5 is representative of the invention and reproduced below:

> 5. A method for scaling a source image to produce a scaled destination image, said method comprising the steps of:
>
> calculating a local context metric from a local portion of the source image;
>
> generating a convolution kernel from a plurality of available convolution kernels based on the calculated local context metric; and
>
> using the generated convolution kernel to generate at least one pixel of the scaled destination image, the scaled destination image having a different resolution than the source image,
>
> wherein the available convolution kernels include at least one smoothing kernel and at least one sharpening kernel.

REFERENCES

Lin	US 6,044,178	Mar. 28, 2000
Miyake	US 6,088,489	Jul. 11, 2000

REJECTIONS AT ISSUE

Claims 3, 5, 6, 8, 10, 12, 14, 16, 18, 20, 22, and 24 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Lin. The Examiner's rejection is on pages 3 through 9 of the Answer.

Claims 7, 9, 13, 15, 19, 21, and 25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lin in view of Miyake. The Examiner's rejections are on pages 10 and 11 of the Answer.

Throughout the opinion, we make reference to the Brief (received October 10, 2006), Reply Brief (received April 13, 2007) and the Answer (mailed January 17, 2007) for the respective details thereof.

ISSUES

Appellant contends that the Examiner's rejection of claims 3, 5, 6, 8, 10, and 12 under 35 U.S.C. § 102(e) is in error. Appellant argues that Lin does not teach "using a convolution kernel that is generated from a plurality of available convolution kernels that include at least one smoothing kernel and at least one sharpening kernel." (App. Br. 5, emphasis omitted). Appellant argues that Lin teaches using two different low pass filters, both of which operate using a smoothing kernel but does not teach a sharpening kernel. (App. Br. 6-7). Further, Appellant argues that the Sigmoid filter of Lin does not use a convolution kernel. (App. Br. 7).

The Examiner responds in the Answer, stating that though Lin uses the term low pass filter in describing the filters, the coefficients of the two of the filters (items 78 and 86) imply a high pass filter. (Answer 12). The Examiner states "a high pass filter passes more of the center pixel's value than does a low pass filter." (Answer 12-13). Thus, the Examiner finds that filters 78 and 86, which maintain the higher frequency attributes of the image, meet the claimed sharpening filter. (Answer 13).

Appellant's contentions on pages 13 and 14 of the Brief, directed to the rejection of claims 14, 16, 18, 20, 22, and 24 under 35 U.S.C. § 102(e), present the same arguments as discussed with respect to claims 3, 5, 6, 8, 10, and 12.

Appellant's contentions on pages 14 through 16 of the Brief, directed to the rejection of claims 7, 9, 13, 15, 19, 21, and 25 under 35 U.S.C. § 103(a), present the same arguments as discussed with respect to claims 3, 5, 6, 8, 10, and 12. Further, Appellant asserts that Miyake does not teach or suggest the limitations missing from Lin.

Thus, the contentions of Appellant present us with the issue of whether Lin teaches using a convolution kernel that is generated from a plurality of available convolution kernels that include at least one smoothing kernel and at least one sharpening kernel.

Further, with respect to the Examiner's rejection based upon 35 U.S.C. § 103(a), the Appellant's contentions present us with the issue of whether Miyake teaches or suggests using a convolution kernel that is generated from a plurality of available convolution kernels that include at least one smoothing kernel and at least one sharpening kernel.

FINDINGS OF FACT

1. Lin teaches a system for adjusting the resolution of image data to be projected by a liquid crystal display (LCD) projector. Abstract.
2. In Lin's system, a source image which contains low frequency information such as graphics and high frequency information such as text is broken up into text portions and graphics portions. The parts are filtered (down sampled) separately, and then merged after filtering. Abstract.
3. The background or graphics portion is low pass filtered with a Gaussian filter, item 72, and then buffered. See figure 3, flow path from items 68-72-74, and col. 6, ll. 17-24 of Lin.
4. The text portion has a different flow path depending upon whether it is white text or black text. Lin, col. 5, ll. 15-20.
5. Both types of text portions are filtered using a low pass Gaussian filter, items 78 and 86. These filters have different coefficients than the filters used for the graphics portion, and help to maintain

the higher frequency attributes of text. Lin, figure 3 and col. 6, ll. 25-63.

6. The text portions are also Sigmoid filtered. This process thresholds the data, i.e. makes the darks darker and lights lighter while maintaining a smooth transition in the mid tones. Lin, col. 7, ll. 5-17.
7. Miyake teaches a system for converting the resolution of image data which makes use of smoothing filters. Abstract.

ANALYSIS

Appellant's arguments have persuaded us of error in the Examiner's finding that Lin teaches using a convolution kernel that is generated from a plurality of available convolution kernels that include at least one smoothing kernel and at least one sharpening kernel. Independent claim 5 recites using a "generated convolution kernel to generate at least one pixel of the scaled destination image, the scaled image having a different resolution than the source image." Independent claims 8, 14, and 16 recite similar limitations. We note that there is no disagreement as to whether Lin teaches this feature, and we find that Lin does teach this feature. Fact 1. Independent claim 5 further recites "wherein the available convolution kernels include at least one smoothing kernel and at least one sharpening kernel." Independent claims 8, 14, and 16 also recite a similar limitation. Appellant's Specification, on page 3, line 12, identifies that the term "kernel" refers to a "function that weights the contribution of source pixels to each destination pixel," and on page 6, line 26, defines a convolution kernel as an "interpolation function." Appellant's Specification, on page 7, Table 1 and

page 8, line 8, identifies that a filter with a Gaussian convolution kernel is a type of smoothing filter.

As discussed above, Lin teaches a system to scale images to a different resolution. Fact 1. This is performed using low pass filters which have kernels. Fact 3. Lin teaches that the Gaussian low pass filters used for text have different coefficients than are used by the filters for graphics. Fact 5. Thus, we find that Lin does teach using a smoothing filter within the scope of the independent claims. However, we do not agree with the Examiner's finding that because the text filter's coefficients permit more high frequency components, they are high pass filters and thus meet the claimed filter with sharpening kernels. A high pass filter filters out low frequencies and passes high frequencies, a low pass filter filters out high frequencies and passes low frequencies. The differences in coefficients of the filters in Lin merely define the upper limit of the low frequencies passed by the filter, they do not transform a low pass filter into a high pass filter. Further, the claim does not differentiate between high pass and low pass filters, but rather smoothing and sharpening kernels. As Appellant has disclosed that a low pass filter with a Gaussian convolution kernel is a form of a smoothing filter, we find that Lin's filters 72, 78, and 86 meet the clamed smoothing convolution kernel and we do not find that the filters 78 and 86 of Lin meet the claimed sharpening convolution kernel.

Further, we note that the Sigmoid filter, which makes the darks darker and lights brighter, enhances contrast and thereby sharpens the image. However, we do not find that Lin teaches that the Sigmoid filter is an interpolation function, a "function that weights the contribution of source

pixels to each destination pixel." Thus, we do not find that the Sigmoid filter meets the claimed sharpening kernel.

For the forgoing reasons, Appellant's arguments have persuaded us of error in the Examiner's rejection of claims 3, 5, 6, 8, 10, 12, 14, 16, 18, 20, 22, and 24 under 35 U.S.C. § 102(e).

Appellant's contentions have similarly persuaded us of error in the Examiner's rejection of claims 7, 9, 13, 15, 19, 21, and 25 under 35 U.S.C. § 103(a). As discussed above, we do not find that Lin teaches the claimed feature of a sharpening kernel. Further, we find that Miyake teaches using smoothing filters. Fact 7. Further, we note that on page 17 of the Answer the Examiner cites to several sections in column 9 of Miyake as teaching sharpening filters. However, we consider the Examiner's finding to be in error as we find that these teachings explicitly discuss using smoothing filters. Thus, we do not find that the combination of Lin and Miyake teaches or suggests the claimed sharpening convolution kernel.

CONCLUSION

We consider the Examiner's rejections of claims 3, 5, 6, 8, 10, 12, 14, 16, 18, 20, 22, and 24 under 35 U.S.C. § 102(e) and of claims 7, 9, 13, 15, 19, 21, and 25 under 35 U.S.C. § 103(a) in error, as we do not find that Lin alone or in combination with Miyake teaches or suggests the limitations in the independent claims.

ORDER

For the foregoing reasons, we will not sustain the Examiner's rejections under 35 U.S.C. § 102(e) and 35 U.S.C. § 103. The decision of the Examiner is reversed.

REVERSED

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